

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**LISTING OF CLAIMS:**

1. (Currently Amended) A substrate for an ion-exchange electrode structure, said substrate comprising an exterior surface wherein at least a portion of the exterior surface is irradiated by a laser radiation to enlarge a reactive surface area on the exterior surface, wherein the reactive surface area has two-scales of roughness, a first scale of roughness at least three orders of magnitude different than a second scale of roughness.
2. (Previously Presented) The substrate of claim 1, wherein the portion of the surface is irradiated by exposing the surface to the laser radiation near an ablation threshold of the substrate.
3. (Original) The substrate of claim 1, wherein the portion of the surface is irradiated by melting, boiling, or quenching part of the surface with laser radiation.
4. (Original) The substrate of claim 1, wherein the laser irradiated surface is coated with a layer of conductive material.
5. (Original) The substrate of claim 4, wherein the conductive material is a metal or an alloy.

6. (Original) The substrate of claim 4, wherein the layer of conductive material is further coated with a continuous or discontinuous layer of catalytic material.

7. (Original) The substrate of claim 6, wherein the catalytic material is selected from a group consisting of Pt, Pt alloys, V, V alloys, titanium dioxide, iron, nickel, lithium and gold.

8. (Original) The substrate of claim 1, wherein the laser irradiated surface is coated with a continuous or discontinuous layer of catalytic material.

9. (Original) The substrate of claim 8, wherein the catalytic material is selected from a group consisting of Pt, Pt alloys, V, V alloys, titanium dioxide, iron, nickel, lithium and gold.

10. (Original) The substrate of claim 8, further comprising micro openings wherein a fuel flows through the micro openings to reach the catalytic material.

Claims 11-46 (Canceled).

47. (Previously Presented) The substrate of claim 1, wherein the reactive surface area includes a projecting surface feature.

48. (Previously Presented) The substrate of claim 47, wherein the projecting surface feature is cone-shaped.

49. (Canceled)

50. (Currently Amended) The substrate of claim 49 1, wherein the first scale of roughness is about  $10^{-6}$  meters.